

Cattail/Kettle Lake

Site Description

Location

Water designation number (WDN)	48-0012-00
Legal description	T125N-R55W-Sec. 6,7,18,19 T125N-R56W-Sec. 1,2,10,11,12,13,14,23,24
County (ies)	Marshall
Location from nearest town	5 miles west and 3 miles north of Eden, South Dakota.

Survey Dates and Sampling Information

Survey dates	August 21-23, 2012 (FN, GN)
Frame net sets (n)	18
Gill net sets (n)	6

Morphometry

Watershed area (acres)	29,465
Surface area (acres)	≈2,800
Maximum depth (ft)	unknown
Mean depth (ft)	unknown

Ownership and Public Access

Cattail/Kettle Lake is a non-meandered lake; however, a significant amount of land previously managed as a Game Production Area (GPA) is now submerged. Water elevations have encroached on private lands creating private ownership of much of the lakeshore. Both private and public land can be found beneath the water. A public access site is located on the west shore of Cattail/Kettle Lake and is maintained by the SDGFP (Figure 1).

Watershed and Land Use

The 29,465 acre Cattail/Kettle Lakes sub-watershed (HUC-12) is located within the larger Northern Coteau Lakes-Upper James River (HUC-10) watershed. Land use within the watershed is primarily agricultural with a mix of pasture or grassland, cropland, and woodland.

Water Level Observations

Cattail/Kettle Lake has no established OHWM and an outlet elevation was not available. On May 16, 2012 the elevation of Cattail/Kettle Lake was 1792.4 fmsl and below the fall 2011 elevation of 1793.6 fmsl. On September 26, 2012 the elevation of Cattail/Kettle Lake was 1790.8 fmsl.

Fish Management Information

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead, Black Crappie, Bluegill, Common Carp, Largemouth Bass, Northern Pike, Smallmouth Bass, White Sucker
Lake-specific regulations	Walleye: minimum length 15"
Management classification	warm-water marginal
Fish consumption advisories	none

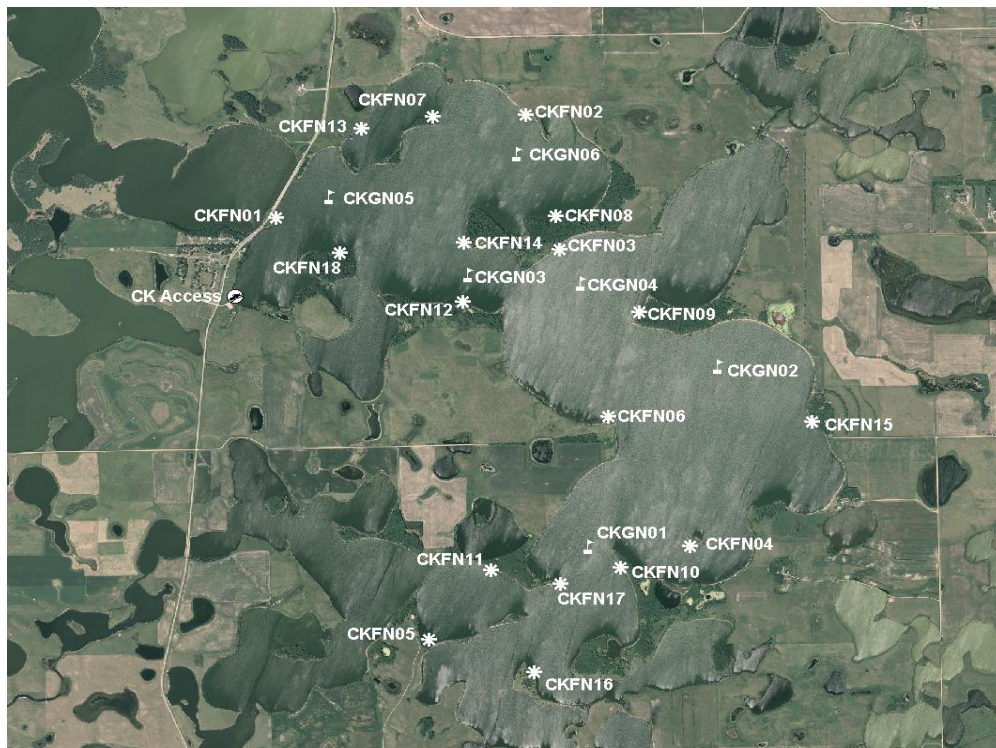
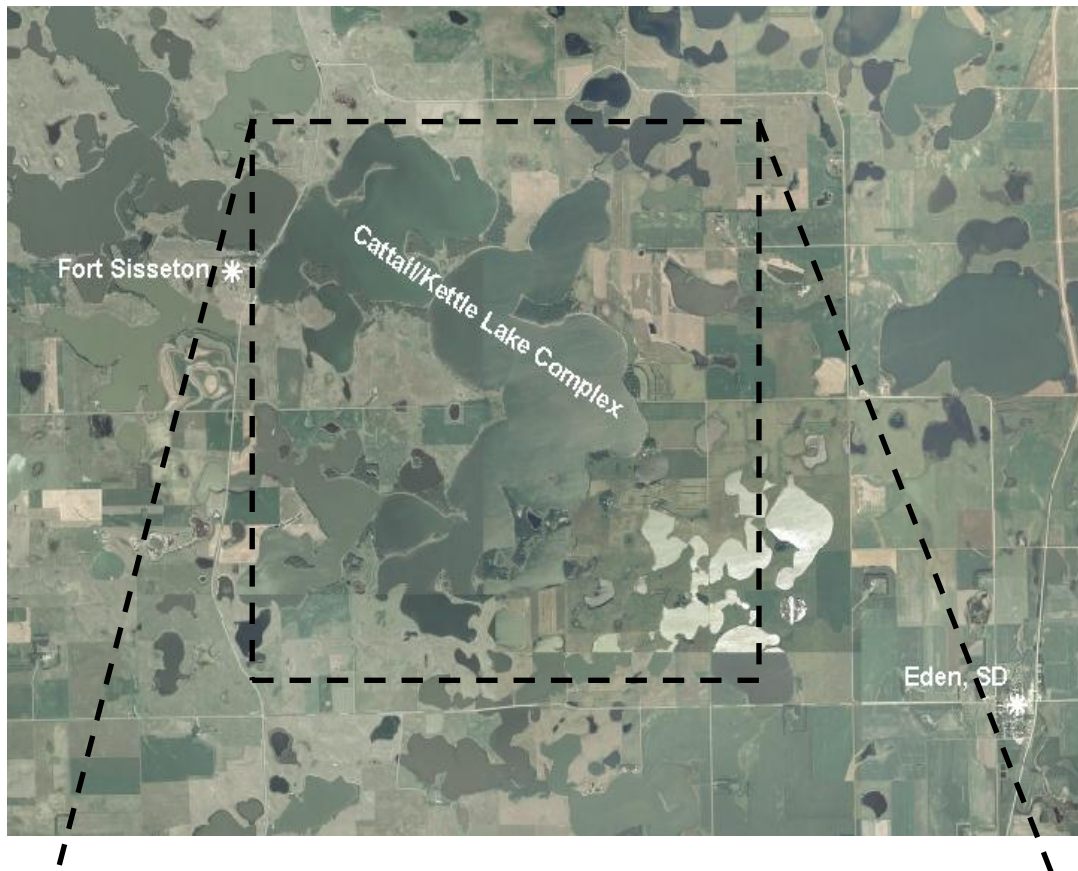


Figure 1. Map depicting location of the Cattail/Kettle Lake Complex from Eden, Marshall County, South Dakota. Also noted are standardized net locations and the access area which includes boat ramp, dock, and public toilet. CKFN = frame nets, CKGN= gill nets

Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length Walleye ≥ 10 , a PSD of 30-60, and a PSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock-length Yellow Perch ≥ 30 , a PSD of 30-60, and a PSD-P of 5-10.
- 3) Maintain a mean frame net CPUE of stock-length Black Bullhead ≤ 100 .

Results and Discussion

Cattail/Kettle Lake is a natural lake located in Marshall County of northeastern South Dakota. High water levels during the 1990's combined Cattail and Kettle lakes along with several smaller sloughs into one large water body that is now commonly referred to as Cattail/Kettle Lake. Water flows into Cattail/Kettle Lake from Lost Lake to the north and through a series of shallow lakes to the northwest. The outlet is located on the southwest corner and flows toward Hickman Dam to the west. During high water events many area lakes become connected allowing fish to move among the various water basins allowing many fish species to be introduced to Cattail/Kettle Lake via these waters. Cattail/Kettle Lake is primarily managed as a Walleye and Yellow Perch fishery. Overall, as many as 10 species of fish contribute to the fishery in Cattail/Kettle Lake.

Primary Species

Walleye: The mean gill net CPUE of stock-length Walleye was 2.8 (Table 1) and below the minimum objective (≥ 10 stock-length Walleye/net night; Table 3). The 2012 gill net CPUE represented a decrease from the 2011 CPUE of 7.5 (Table 2) and was the lowest recorded from 2003-2012 (Table 2). Currently, relative abundance is considered low.

Gill net captured Walleye ranged in TL from 27 to 54 cm (10.6 to 21.3 in; Figure 2). Otoliths were collected from sampled Walleye and age structure information suggested the presence of four year classes (2006, 2008, 2010, and 2011; Table 4). However, each year class was represented by few individuals (Table 4). Although natural recruitment has contributed to the population (e.g., 2009); larger year classes tend to coincide with fry stockings (Table 4; Table 6). Limited recruitment of the 2010 cohort and potentially the 2011 year class, which coincided with a fry stockings, have resulted in the current low relative abundance (Table 4). The 2011 year class was abundant in the 2011 gill net catch; however, only six individuals were captured in 2012 (Table 4).

Walleye stocked in 2011 were marked with Oxytetracycline (OTC) so that the contribution of stocked fish could be evaluated (Table 4). The estimated stocking contribution for the 2011 year class was 30% (Table 4). However, it was noted that individual marks were faint; therefore, the contribution of stocked walleye may have

been higher. Few inferences can be made concerning size structure, growth, and condition of stock-length walleye due to low sample size.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 152.0 (Table 1) and well above the minimum objective (≥ 30 stock-length Yellow Perch/net night; Table 3). Since 2003, the mean gill net CPUE of stock-length yellow perch has fluctuated from a low of 21.5 (2006) to a high of 152.0 (2012; Table 2). Based on the 2012 gill net catch, relative abundance is high.

Yellow Perch captured in the gill net catch ranged in TL from 9 to 25 cm (3.5 to 9.8 in), with the majority (67%) being \leq stock-length (13 cm; 5 in; Figure 3). The majority of stock-length Yellow Perch were in the stock-quality length category resulting in low PSD and PSD-P values of 10 and 2, respectively (Table 1; Table 3; Figure 3). Both the PSD and PSD-P were below management objectives of 30-60 and 5-10 (Table 3).

Otoliths were collected from a sub-sample of gill net captured Yellow Perch. Age structure information indicated that Yellow Perch in Cattail/Kettle Lake tend to exhibit consistent recruitment of varying magnitude (Table 7). In 2012, three consecutive year classes (2009-2011) were present in the gill net catch (Table 7). The 2011 cohort was the most represented and comprised 93% of sampled Yellow Perch.

Yellow Perch growth appeared to be slower in 2012 than past years. The weighted mean TL at capture of age-1 Yellow Perch was 121 mm (4.8 in) in 2012 compared to 157, 159, and 163 mm (6.2, 6.3, and 6.4 in) from 2009-2011 (Table 8). Age-2 Yellow Perch had a 2012 weighted mean TL at capture of 195 mm (7.7 in) compared to 227, 210, and 212 mm (8.9, 8.3, and 8.3 in) in 2009, 2010, and 2011, respectively (Table 8). In 2012, the weighted mean TL at capture for age-1 and age-2 male Yellow Perch was 115 and 189 mm (4.5 and 7.4 in); while the weighted mean TL at capture for age-1 and age-2 female Yellow Perch was 128 and 197 mm (5.0 and 7.8 in; Table 8). Gill net captured Yellow Perch had mean W_r values that ranged from 87 to 96 for all length categories (e.g., stock to quality) sampled. A slight decreasing trend in condition was apparent as TL increased.

Other Species

Black Bullhead: Since 2003, the mean frame net CPUE of Black Bullhead has ranged from 0.0 (2009, 2010) to 548.7 (2003; Table 2). In 2012, the mean frame net CPUE was 4.4 (Table 1) and within the management objective (≤ 100 stock-length Black Bullhead/net night). Poor recruitment of black bullheads in many northeastern South Dakota lakes has been common in recent years limiting their abundance.

Black Crappie: The mean frame net CPUE of stock-length black crappie was 11.9 (Table 1). The 2012 frame net CPUE represented an increase from the 2011 CPUE of 5.5 and was the highest recorded since 2003 (Table 2). Currently, relative abundance is high.

Frame net captured black crappie ranged in TL from 6 to 24 cm (2.4 to 9.4 in; Figure 4). The majority (98%) of Black Crappie in the frame net catch were from year classes produced in 2011 and 2012, which resulted in the low PSD of 4 and PSD-P of 0 (Table 1; Table 9; Figure 4). Although well represented in the frame net catch (Table 9), Black Crappie from the 2012 year class have not survived their first winter of life and are not considered recruited to the population. Recruitment of the 2012 cohort will be assessed in upcoming surveys.

Black crappie in the frame net catch had a weighted mean TL at capture of 139 mm (5.5 in) at age 1 and 224 mm (8.8 in) at age 2 (Table 10). Sampled Black Crappie had mean Wr values that were ≥ 105 for all length categories (e.g., stock to quality) sampled, with the mean Wr for stock-length black crappie being 117 (Table 1). No length-related trends in condition were apparent.

Northern Pike: Northern pike relative abundance in Cattail/Kettle Lake has generally been considered low to moderate with mean gill net CPUE values that ranged from 0.0 to 1.7 from 2003-2011 (Table 2). In 2012, the mean gill net CPUE of stock-length Northern Pike increased to 4.0 (Table 1) and indicated high relative abundance.

Northern Pike captured in the gill net sample ranged in TL from 43 to 71 cm (16.9 to 28.0 in). Although sample size was low, Northern Pike condition appeared to be similar to that of Northern Pike captured from other northeast South Dakota glacial lakes (e.g., Roy and Clear Lakes) with mean Wr values that ranged from 92 to 94 for all length categories (e.g., stock to quality) sampled. Stock-length northern pike had a mean Wr of 93 (Table 1) and no length-related trends in condition were apparent.

Other: Bluegill, Common Carp, Largemouth Bass, and White Sucker were other fish species captured in low numbers during the 2012 survey (Table 1).

Management Recommendations

- 1) Conduct annual fish community assessment surveys utilizing fame nets and experimental gill nets (next survey scheduled in summer 2013) to monitor fish relative abundance, size structure, growth and stocking success.
- 2) Conduct fall night electrofishing annually to monitor age-0 walleye relative abundance.
- 3) Stock walleye (≈ 500 fry/acre) to establish additional year classes if fall night electrofishing CPUE of age-0 walleye and gill netting results warrant [i.e., low gill net CPUE of sub-stock (i.e., < 25 cm; 10 in) walleye and/or fall night electrofishing CPUE of age-0 walleye < 75 fish/hour].
- 4) Collect otoliths from walleye and yellow perch to assess the age structure and growth rates of each population.
- 5) Maintain the 381-mm (15 in) minimum length limit on Walleye. The regulation is designed to protect smaller fish from harvest and increase average fish size (Lucchesi and Blackwell 2009).

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish, for various fish species captured using frame nets, experimental gill nets or electrofishing from Cattail/Kettle Lake, 2012. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; COC= Common Carp; LMB= Largemouth Bass; NOP = Northern Pike; SMB= Smallmouth Bass; WAE = Walleye; WHS = White Sucker; YEP = Yellow Perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
<i>Frame nets</i>								
BLB	4.4	1.2	29	9	0	---	91	<1
BLC	11.9	2.5	4	2	0	---	117	2
BLG	2.4	0.9	5	5	0	---	111	1
COC	0.2	0.2	50	50	25	59	106	3
LMB	0.2	0.1	25	59	25	59	118	12
NOP	0.5	0.2	89	21	22	27	87	4
SMB	0.6	0.3	73	26	45	29	106	5
WAE	0.5	0.3	44	33	44	33	91	3
WHS	0.3	0.3	100	0	20	43	90	3
YEP	21.2	7.2	1	1	0	---	90	2
<i>Gill nets</i>								
BLB	2.3	2.6	0	---	0	---	106	4
BLC	12.3	8.1	0	---	0	---	119	<1
NOP	4.0	1.9	75	15	4	7	93	2
WAE	2.8	1.7	65	21	18	7	94	4
WHS	1.3	1.1	75	31	38	35	103	12
YEP	152.0	26.5	10	2	2	1	95	1

Table 2. Historic mean catch rate (CPUE; frame/gill nets= catch/net night, electrofishing= catch/hour) of stock-length fish for various fish species captured by experimental gill nets, frame nets, and electrofishing from Cattail/Kettle Lake, 2003-2012. BLB = Black Bullhead; BLC= Black Crappie; BLG= Bluegill; COC= Common Carp; LMB= Largemouth Bass; NOP = Northern Pike; SMB = Smallmouth Bass; WAE = Walleye; WHS = White Sucker; YEP = Yellow Perch

Species	2003	2004	2005	2006 ¹	2007 ¹	2008	2009	2010	2011	2012
<i>Frame nets</i>										
BLB	548.7	5.4	1.3	15.1	2.9	0.1	0.0	0.0	0.1	4.4
BLC	0.9	0.6	1.3	10.3	7.1	2.5	0.4	1.9	5.5	11.9
BLG	0.0	0.0	0.0	0.0	0.0	1.8	0.1	0.7	1.8	2.4
COC	0.6	0.4	1.7	4.2	3.2	0.9	0.4	0.5	0.1	0.2
LMB	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.2
NOP	1.9	1.1	1.3	0.8	0.2	1.3	0.6	0.3	0.2	0.5
SMB	0.3	0.0	0.0	0.8	0.0	0.8	0.2	0.7	1.3	0.6
WAE	4.1	2.3	5.4	3.8	2.3	2.0	1.2	0.3	0.1	0.5
WHS	0.9	0.4	3.9	0.8	0.1	0.2	0.1	0.1	0.1	0.3
YEP	0.7	0.9	0.6	2.7	1.9	3.2	5.6	18.7	19.0	21.2
<i>Gill nets</i>										
BLB	42.2	6.2	1.3	38.0	2.8	0.0	0.0	0.0	0.0	2.3
BLC	0.8	0.5	0.8	9.7	4.7	0.3	0.7	30.7	8.3	12.3
COC	0.0	0.0	0.0	2.5	8.5	2.0	1.5	0.3	0.3	0.0
NOP	0.7	1.5	0.5	0.0	1.7	1.3	0.8	0.3	0.7	4.0
SMB	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.7	0.3	0.0
WAE	15.5	15.0	20.7	10.8	15.0	5.3	6.7	8.5	7.5	2.8
WHS	1.3	0.5	0.0	0.2	0.2	0.2	0.3	0.5	0.5	1.3
YEP	42.3	42.5	23.5	21.5	72.5	58.7	83.0	140.2	92.2	152.0
<i>Electrofishing</i>										
WAE ²	---	---	---	---	---	295.1	---	0.0	87.0	---

¹ Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

² Fall Electrofishing-WAE; catch rate (CPUE) represents age-0 Walleye/hour

Table 3. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) for selected species captured in frame nets and experimental gill nets from Cattail/Kettle Lake, 2003-2012. BLB = Black Bullhead; BLC= Black Crappie; NOP = Northern Pike; WAE = Walleye; YEP = Yellow Perch

Species	2003	2004	2005	2006 ₁	2007 ₁	2008	2009	2010	2011	2012	Objective
<i>Frame nets</i>											
BLB											
CPUE	549	5	1	15	3	<1	0	0	<1	4	≤ 100
PSD	8	87	100	53	71	100	---	---	50	29	---
RSD-P	8	83	92	39	6	100	---	---	0	0	---
Wr	88	100	98	95	91	85	---	---	88	91	---
BLC											
CPUE	1	1	1	10	7	3	<1	2	6	12	---
PSD	71	70	4	4	84	78	57	31	4	4	---
RSD-P	71	60	4	0	9	64	57	31	2	0	---
Wr	98	112	121	112	111	111	112	115	113	117	---
<i>Gill nets</i>											
NOP											
CPUE	1	2	1	0	2	1	1	<1	1	4	---
PSD	100	100	100	---	90	100	100	50	100	75	---
RSD-P	50	11	33	---	20	0	20	50	0	4	---
Wr	78	85	92	---	88	84	83	91	88	93	---
WAE											
CPUE	16	15	21	11	15	5	7	9	8	3	≥ 10
PSD	88	51	71	95	53	16	90	67	80	65	30-60
RSD-P	23	12	15	18	27	9	3	12	20	18	5 – 10
Wr	90	94	97	97	89	87	88	96	96	94	---
YEP											
CPUE	42	43	24	22	73	59	83	140	92	152	≥ 30
PSD	16	19	11	72	24	26	3	10	16	10	30-60
RSD-P	0	7	3	17	6	2	0	0	1	2	5-10
Wr	106	99	101	98	103	107	105	102	95	95	---

¹ Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 4. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Cattail/Kettle Lake, 2008-2012.

Survey Year	Year Class													
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
2012		6	4		6		1							
2011 ¹	---	85	8	4	21		9	1					1	
2010 ¹	---	---	6	6	20		22			1				
2009	---	---	---	13	11		35	1						
2008	---	---	---	---	29	2	26			1				1
# stocked														
fry		1400	1350		4000		2700					3000	3000	3900
small fingerling										300				200
large fingerling														

¹ Older walleye were sampled, but are not reported in this table

Table 5. Weighted mean length at capture (mm) for Walleye age-0 through age-10 captured in experimental gill nets (expanded sample size) from Cattail/Kettle Lake, 2005-2012. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age										
	0	1	2	3	4	5	6	7	8	9	10
2012	---	301(6)	440(4)	---	494(6)	---	546(1)	---	---	---	---
2011 ¹	143(85)	322(8)	407(4)	452(21)	---	517(9)	549(1)	---	---	---	---
2010 ¹	168(6)	299(6)	372(20)	---	482(22)	---	---	608(1)	---	---	---
2009 ¹	135(13)	242(11)	---	411(35)	438(1)	---	---	---	---	---	---
2008 ¹	124(29)	257(2)	323(26)	---	---	473(1)	---	---	---	635(1)	---
2007		256(62)	403(10)	444(7)	479(5)	570(1)	499(2)	553(3)	558(7)	---	590(13)
2006	183(15)	199(2)	326(3)	429(49)	522(1)	507(1)	563(1)	568(4)	554(4)	643(1)	543(1)
2005	---	305(25)	393(52)	463(13)	482(3)	490(8)	507(4)	---	537(18)	---	---

Table 6. Stocking history including size and number for fishes stocked into Cattail/Kettle Lake, 1999-2012. WAE= Walleye

Year	Species	Size	Number
1999	WAE	fry	3,900,000
	WAE	fingerling	200,000
2000	WAE	fry	3,000,000
2001	WAE	fry	3,000,000
2003	WAE	fingerling	300,290
2006	WAE	fry	2,700,000
2008	WAE	fry	4,000,000
2010	WAE	fry	1,350,000
2011	WAE	fry	1,400,000

Table 7. Year class distribution based on expanded age/length summary for Yellow Perch sampled in gill nets from Cattail/Kettle Lake, 2009-2012.

Survey Year	Year Class						
	2012	2011	2010	2009	2008	2007	2006
2012		2573	187	14			
2011	---	11	453	108	4		
2010	---	---	463	710	131		
2009	---	---	---	9	488	17	1

Table 8. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Cattail/Kettle Lake, 2009-2012.

Year	Age			
	0	1	2	3
2012				
Male	---	115(1103)	189(38)	---
Female	---	128(1440)	197(160)	254(15)
Combined	---	121(2573)	195(187)	254(14)
2011				
Male	88(10)	156(151)	183(28)	---
Female	92(1)	167(314)	228(68)	271(4)
Combined	89(11)	163(453)	212(108)	271(4)
2010				
Male	93(232)	154(227)	197(40)	---
Female	94(169)	163(491)	228(69)	---
Combined	94(463)	159(710)	210(131)	---
2009				
Male	89(9)	150(118)	217(2)	---
Female	---	160(370)	228(15)	285(1)
Combined	89(9)	157(488)	227(17)	285(1)

Table 9. Year class distribution based on expanded age/length summary for Black Crappie sampled in frame nets from Cattail/Kettle Lake, 2008-2012.

Survey Year	Year Class										
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
2012	190	252	9					1			
2009	---	---	---	7	3			4			
2008	---	---	---	---	1	11	4	27	3		1

Table 10. Weighted mean TL (mm) at capture for Black Crappie captured in frame nets (expanded sample size) from Cattail/Kettle Lake, 2008-2012.

Year	Age							
	0	1	2	3	4	5	6	7
2012	85(190)	139(252)	224(9)	---	---	---	---	359(1)
2009	82(7)	136(3)	---	---	299(4)	---	---	---
2008	81(1)	136(11)	211(4)	276(27)	306(3)	---	325(1)	---

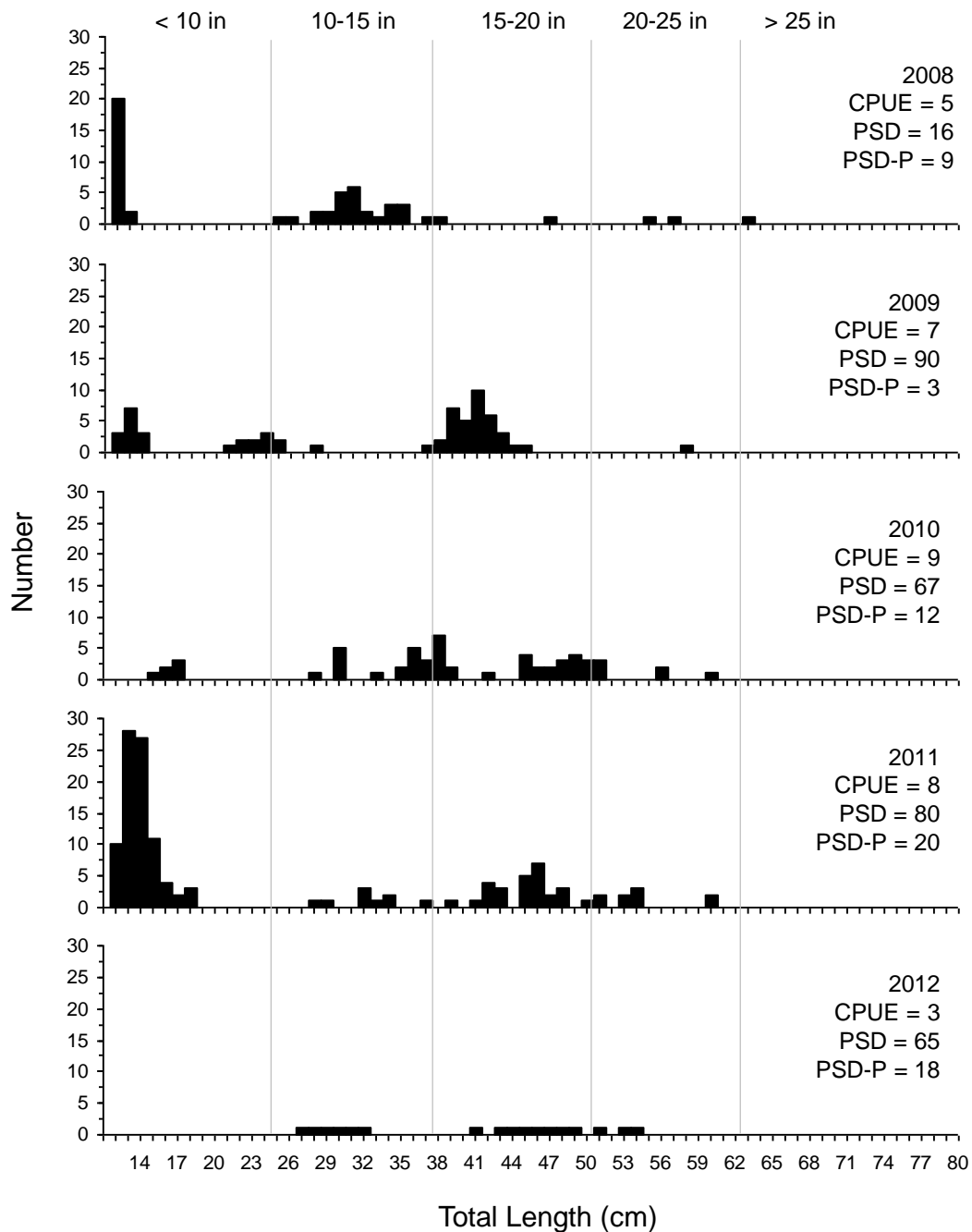


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Cattail/Kettle Lake, 2008-2012.

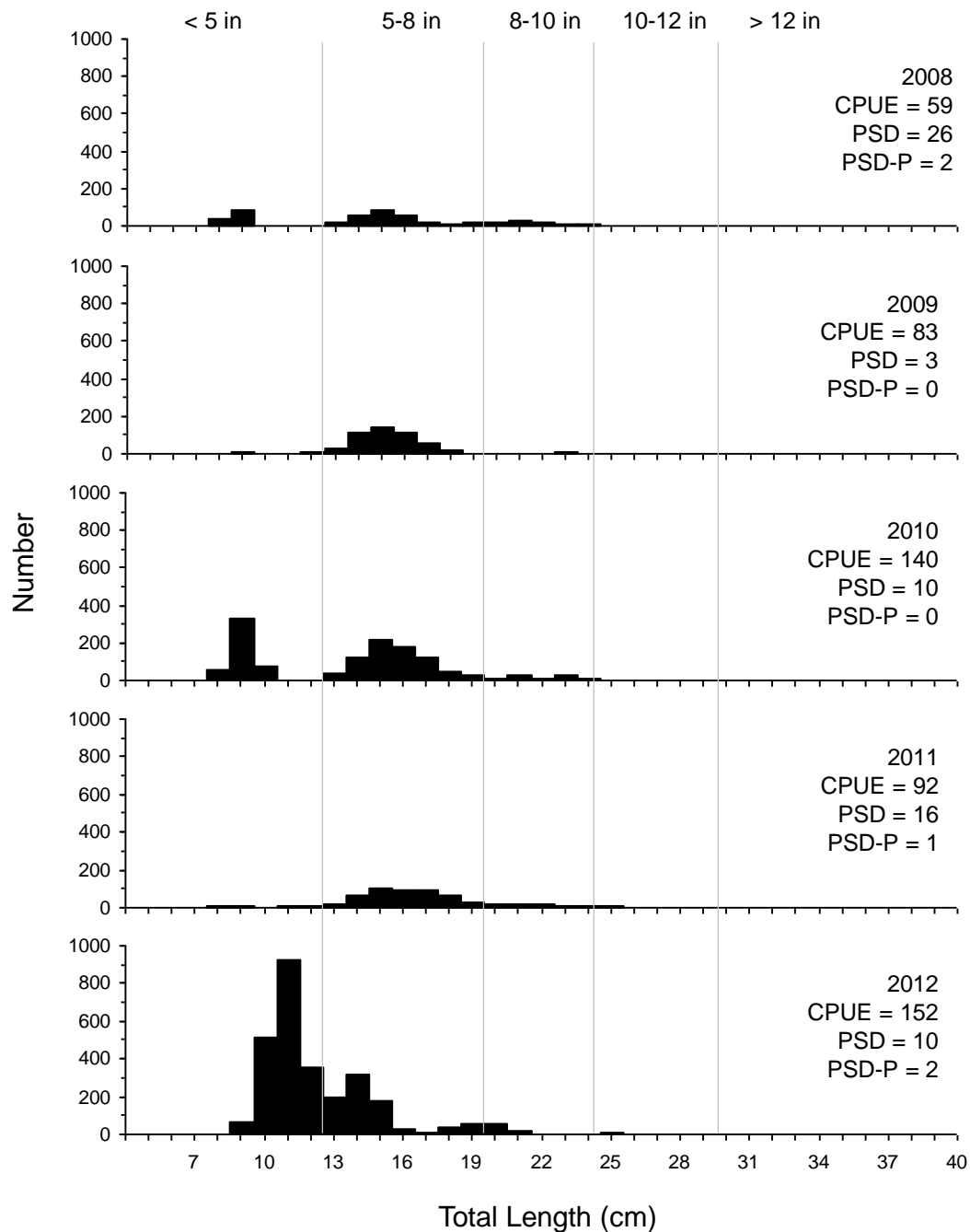


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in Cattail-Kettle Lake, 2008-2012.

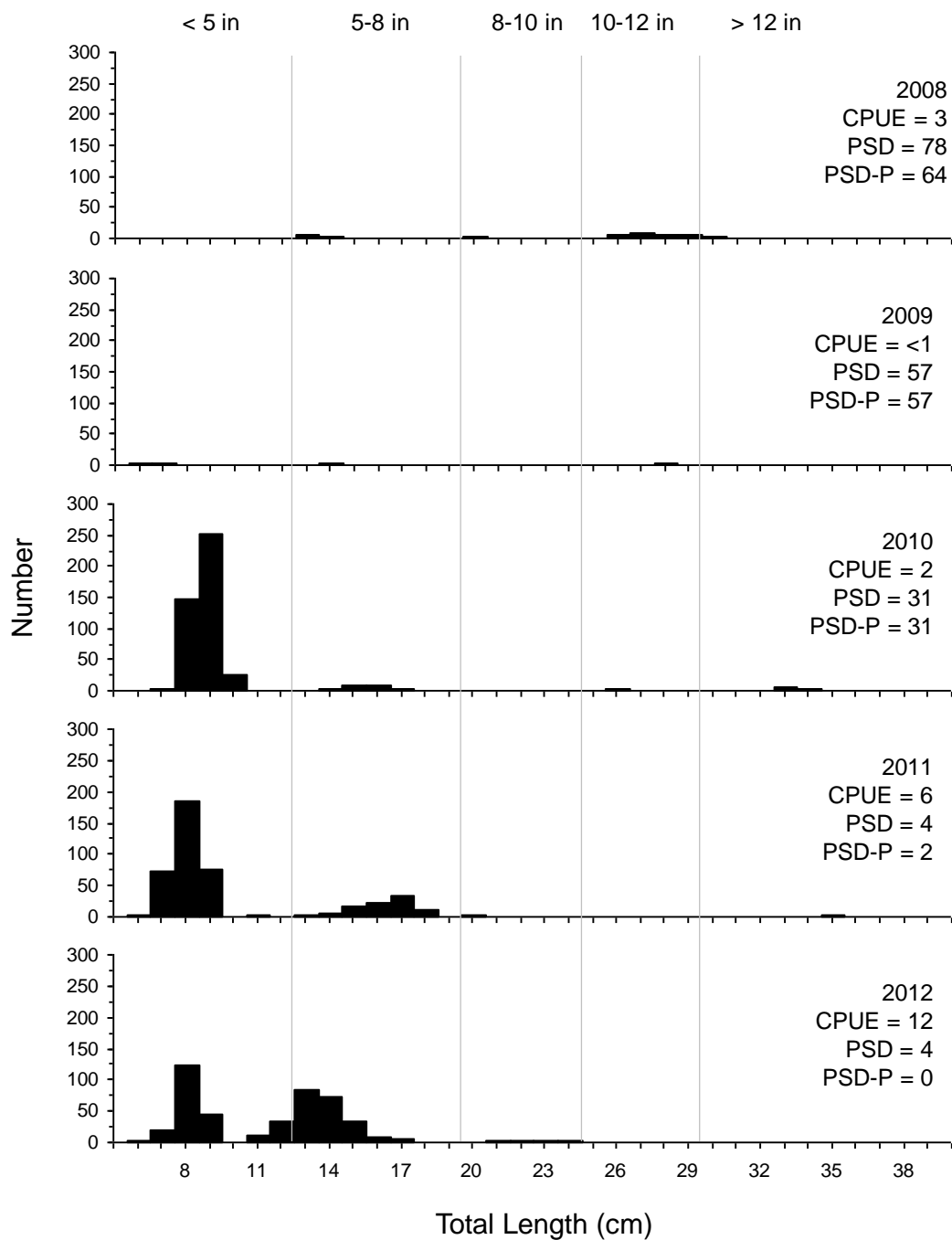


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Crappie captured using frame nets in Cattail-Kettle Lake, 2008-2012.